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SOUTHERN FOREST EXPERIMENT STATION

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New Orleans, La.



PULPING AND NONPULPING CORDWOOD VOLUME
IN SURVEY UNIT NO. 1,
TEXAS

By

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* - This is an advance release of Forest Survey data that will be included in complete reports to be published later. This information is subject to correction or amplification as computations proceed.

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PULPING AND NONPULPING CORDWOOD VOLUME

IN SURVEY UNIT NO. 1, TEXAS

This report presents advance information on the volume and character of cordwood in Texas Survey Unit No. 1, an area of nearly ten million acres. The Unit, shown in figure 1, includes all of seventeen counties in the southeastern part of the State. It forms a part of the two natural geographic divisions of the State known as the East Texas Timber Country and the Gulf Coast Prairie. Its surface relief, similar to the rest of the Atlantic Coastal Plain, is characterized by rolling or undulating terrain. Rising gradually from a flat plain in the coastal prairies, the Unit's topography in the northern part attains an elevation of 300 to 600 feet above sea level. Except in the coastal prairies the area, generally speaking, is well drained. The Angelina, Brazos, Trinity, Neches, and Sabine Rivers, and their numerous tributaries, flow through it in a southeasterly direction toward the Gulf of Mexico.

More than three-fourths of the forest area of the Unit occurs in rolling uplands and flatwoods, the remainder being found in river bottoms, swamps, bays, and branch heads.

Four large railroad systems, the Southern Pacific, Missouri Pacific, Texas and Pacific, and Western Pacific, as well as a number of lesser lines, provide ample rail transportation facilities in the Unit. In addition, it is well served with hard-surfaced state and federal highways and graded county roads. Deep water shipping facilities are also at hand in Houston, Galveston, Beaumont, and Port Arthur.

The estimates of land area and wood volume given in this report are based on data gathered from September 1934 to March 1935 by the Forest Survey, a part of the U. S. Forest Service and an activity of the Southern Forest Experiment Station, with headquarters at New Orleans, La. These estimates are preliminary and subject to correction and modification when final computations are completed, but such changes are not likely to be extensive or important.

Three-man crews of specially trained timber estimators made the inventory by measuring the timber and recording the forest and land-use conditions on 12,528 one-quarter-acre sample plots. These plots, located at intervals of 660 feet on parallel compass lines ten miles apart, give an adequate picture of all the land area in the Unit.

In presenting this estimate of timber suitable for conversion into pulpwood, the Forest Survey has not taken into account the prior claims of other forest industries. These must be considered before any planned expansion of the pulpwood industry in this Unit is undertaken. Moreover, the future timber supply must be safeguarded by building up an ample growing stock. The lumber industry of the future, for example, must depend largely upon the growth of young trees now below saw-timber size; hence too widespread a use at present of trees in the 6- to 14-inch diameter classes for pulpwood would seriously jeopardize the future of the lumber industry. Other wood-using industries, similarly, are dependent upon the perpetuation of the forest, which means that the growing stock must be adequately and continuously maintained for the benefit of all.

As soon as survey data covering the growth, drain, and economic aspects of the forest have been analyzed and interpreted, a basis will have been established for determining the relative volumes of pulpwood, saw timber, and other forest products that this Unit can perpetually produce. Basic policies that can be used as guides in the effective management of the forests of this Unit will eventually be published as a part of a comprehensive, detailed report.

Land Area

Table 1 classifies the land area of the Unit by major land-use classes, among which productive forest area is by far the most important. The very low percentage of area that is now in cultivation (13 percent), after a century of settlement, indicates that most of the land is better suited to other uses. The tabular figures, showing that the land is going out of cultivation more rapidly than it is being converted to crop land, substantiate this fact. The relatively large area of improved pasture in the Unit (12 percent of the total) is also significant. Much of this pasture land is found in the natural prairies of the southern counties, Harris, Liberty, Jefferson, and Orange, where large unbroken tracts of land have been taken over by the cattle industry. Fenced and uncultivated, these tracts are virtually treeless.

TABLE 1 -- Area¹ classified by major land uses

Land-use classes	Area in acres	Percent of total area
Forest:		
Productive	6,589,500	66.8
Nonproductive ²	11,700	.1
Total forest	6,601,200	66.9
Agricultural:		
In cultivation:		
Old crop land ³	1,258,700	12.8
New crop land ⁴	16,400	.2
Out of cultivation:		
Idle ⁵	169,300	1.7
Abandoned ⁶	82,700	.8
Improved pasture ⁷	1,194,700	12.1
Total agricultural	2,721,800	27.6
Other:		
Prairie)		
Marsh)		
Waterways)	540,800	5.5
Towns and villages)		
Roads, railroads, etc.)		
Total area	9,863,800	100.0

¹ Does not include meanderable water area.

² Nonproductive forest land is forest area that has not the qualities essential for the growth of commercial timber species.

³ Land cultivated at least five years and on which a farm crop was raised within two years prior to the date of survey.

⁴ Land converted from forest to crop land within five years prior to survey date.

⁵ Cultivated land that has been idle for two years or more, but has not reached the abandoned stage.

⁶ Land once cultivated but showing distinct evidence of having been abandoned for agricultural crop production; no attempt has been made to maintain it as improved pasture.

⁷ Cleared or open land under fence used primarily for grazing; a real attempt has been made to produce and maintain a sod.

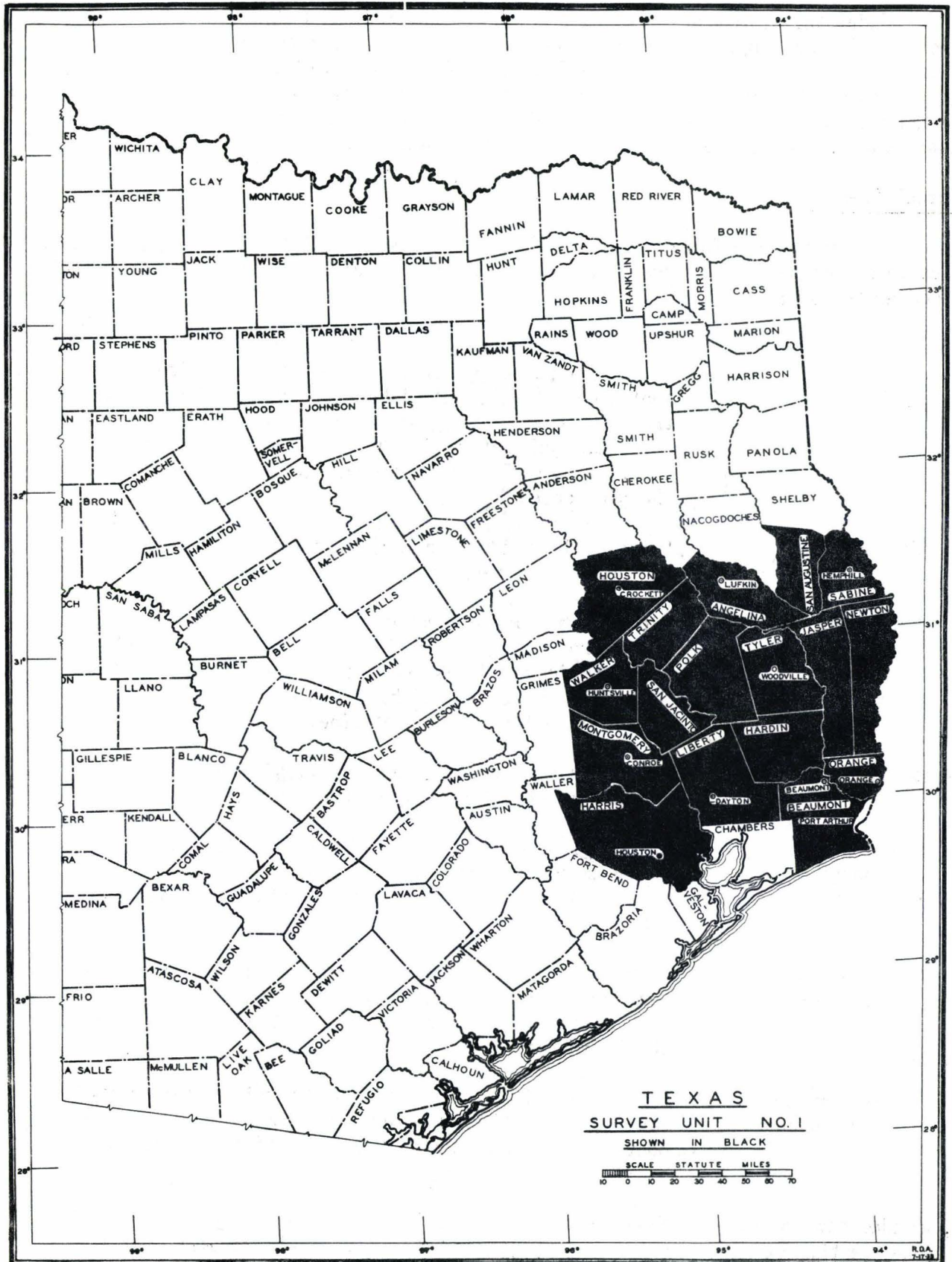


FIGURE 1. -- Geographical location of Survey Unit No. 1, Texas.

Under the system of sampling used in the collection of survey data, items which are of infrequent occurrence and relatively small in quantity cannot be determined with as high a degree of accuracy as is obtainable for items which occur more frequently and in substantially greater quantities. Small tabular figures, therefore, are to be taken as showing, not the exact magnitudes of the items involved, but their relative magnitudes in comparison with those of other items.

Forest Area

The productive forest area of this Unit totals 6,589,500 acres. Table 2 classifies this area by forest conditions and forest type groups. Forest conditions are defined as follows:

Old growth:	Stands composed predominantly of saw-log-sized trees that have the characteristics of the original mature trees found in the region. ("Saw-log-sized" signifies a minimum diameter of 13.0 inches outside of bark at breast height in the hardwood species, 9.0 inches in the pine species).
Uncut:	Old-growth stands from which less than 10 percent of the volume has been cut.
Partly-cut:	Old-growth stands from which 10 percent or more of the volume has been cut, but in which the remaining volume per acre in saw-log-sized trees is at the rate of at least 1,000 board feet of hardwood or hardwood and pine mixed, or 600 board feet of pine.
Second growth:	Stands that have succeeded the original old growth as a result of forest cutting or other causes.
Saw-log size uncut:	Second-growth stands from which less than 10 percent of the saw-log-sized trees have been cut, and in which the volume per acre is at the rate of at least 600 board feet.
Saw-log size partly-cut:	Second-growth stands from which 10 percent or more of the saw-log-sized trees have been cut, but in which the remaining volume per acre is at the rate of at least 400 board feet.
Under saw-log size uncut:	Second-growth stands in which the volume per acre of saw-log-sized timber is at the rate of less than 600 board feet. Less than 10 percent of the trees under saw-log size have been cut.
Under saw-log size partly-cut:	Second-growth stands in which the volume per acre of saw-log sized timber is at the rate of less than 400 board feet. Ten percent or more of the trees under saw-log size have been cut.

Clear-cut: Cut-over stands in which the volume per acre in saw-log-sized trees is at the rate of less than 1000 board feet of hardwood or hardwood and pine mixed, or less than 600 board feet of pine; and in which an insufficient quantity of young growth has come in to classify the stands either as reproduction or as second-growth.

Reproduction: Areas of young growth bearing seedlings less than one inch in diameter at the rate of more than 80 per acre.

Table 2 indicates that in the productive forest area loblolly and short-leaf pine are gradually taking over areas once characterized by virgin stands of longleaf pine. In the old-growth conditions loblolly and shortleaf pine stands occupy an area which is more than twice as great as the longleaf pine area, but in the second-growth conditions this proportion has increased to seven to one. The geographic distribution of the major forest types in the Unit is shown in the map presented in figure 2.

TABLE 2. -- Productive forest area by forest conditions and forest type groups

Forest conditions	Forest type groups designated by predominant species			Total	Percent of total produc- tive forest area
	Longleaf pine	Loblolly and short- leaf pine	Hardwood		
----- Acres -----					
Old-growth:					
Uncut	25,800	154,500	330,100	510,400	7.7
Partly-cut	102,300	120,100	343,400	565,800	8.6
Total	128,100	274,600	673,500	1,076,200	16.3
Second-growth:					
Saw-log size:					
Uncut	174,800	1,883,900	419,800	2,478,500	37.6
Partly-cut	39,700	677,400	172,500	889,600	13.5
Under saw-log size:					
Uncut	286,400	1,005,100	352,700	1,644,200	25.0
Partly-cut	10,900	42,900	28,100	81,900	1.2
Total	511,800	3,609,300	973,100	5,094,200	77.3
Clear-cut ¹	195,100	17,200	3,100	215,400	3.3
Reproduction	93,600	64,800	45,300	203,700	3.1
Total productive forest area	928,600	3,965,900	1,695,000	6,589,500	100.0
Percent of total pro- ductive forest area	14.1	60.2	25.7	100.0	

¹ This includes a relatively small area in the fire-killed condition.

Volume Estimate

The volume estimate for this Unit is expressed in standard stacked cords, 4 x 4 x 8 feet, containing 90 cubic feet of pine wood (including bark), and 80 cubic feet of hardwood (including bark). This estimate covers only the stemwood 4.0 inches or larger in diameter in all live, sound trees whose diameter outside of bark at breast height is at least 5.0 inches. It therefore disregards altogether all trees less than 5.0 inches in diameter at breast height, and excludes all stemwood less than 4.0 inches in diameter outside of bark, as well as all limbwood. No deduction was made for woods cull---that part of the tree that would be left in the woods because of rot, fire-scar, crook, bad knots, or other defects. While final computation of woods cull has not been made, it is believed that the deduction will be between three percent and six percent in cubic volume.

Although Texas Survey Unit No. 1 is within the natural range of longleaf pine, very few turpentine operations are carried on there. No natural slash pine whatever is found in this region, and the ratio between the longleaf pine area and the total pine area is small and gradually diminishing. Thus the few longleaf pine trees that have been or are being worked for naval stores are not sufficiently numerous to be brought into the tabular classification in tables 3 and 4.

Table 3 shows the total cordwood volume in the Unit, classified by tree species groups, diameter classes, and forest type groups. The importance of loblolly and shortleaf pine, which constitute 50.2 percent of the total cordwood volume, is at once apparent. Longleaf pine, in contrast, makes up only 4.3 percent of the total cordwood volume. Considering only species suitable for the manufacture of pulp, the pines make up 77 percent of the total in the Unit. Nearly two-thirds of the pine volume is in trees less than 13 inches in diameter, a size most suitable for pulpwood production. Red gum, with 51 percent of the total volume in pulping hardwoods, is the most abundant species in that group. Pulping hardwood trees less than 13 inches in diameter comprise more than half the total pulping hardwood volume.

Significant data from table 3, showing the relationship between cordwood volumes in the various tree-diameter classes, are illustrated in figure 3. It is seen here that in all species groups the future supply of wood is increasing. For example, the volume in shortleaf and loblolly trees 20 inches and over in diameter is 3,834,000 cords; whereas in the 14- to 18-inch diameter class the volume is more than eleven million cords; and in the 10- to 12-inch diameter class it is still larger, more than fifteen million cords. A corresponding increase, though less striking, is noticeable in the diameter classes of all the other tree species groups.

Notwithstanding the timber volume shown in table 3 to be suitable for pulpwood production, no attempt is made here to estimate what part of it will presently be available for use as pulpwood. Among the factors governing such an estimate are: the prior claims of established industries, the accessibility of the timber stands, and the provision for reproduction and future growing stock. Trees in the 6-, 8-, 10-, and 12-inch diameter classes comprise 60 percent of the total cordage in the pulping species. These young trees are not being extensively utilized at present, but the extent to which they can be converted into pulpwood must necessarily be influenced by the demands of other forest products industries. Thrifty of growth, they serve as a nucleus for future timber crops on which various wood-using industries must depend. If properly managed, particularly to the extent of periodical thinnings, these young stands should furnish a continual supply of pulpwood and other forest products.

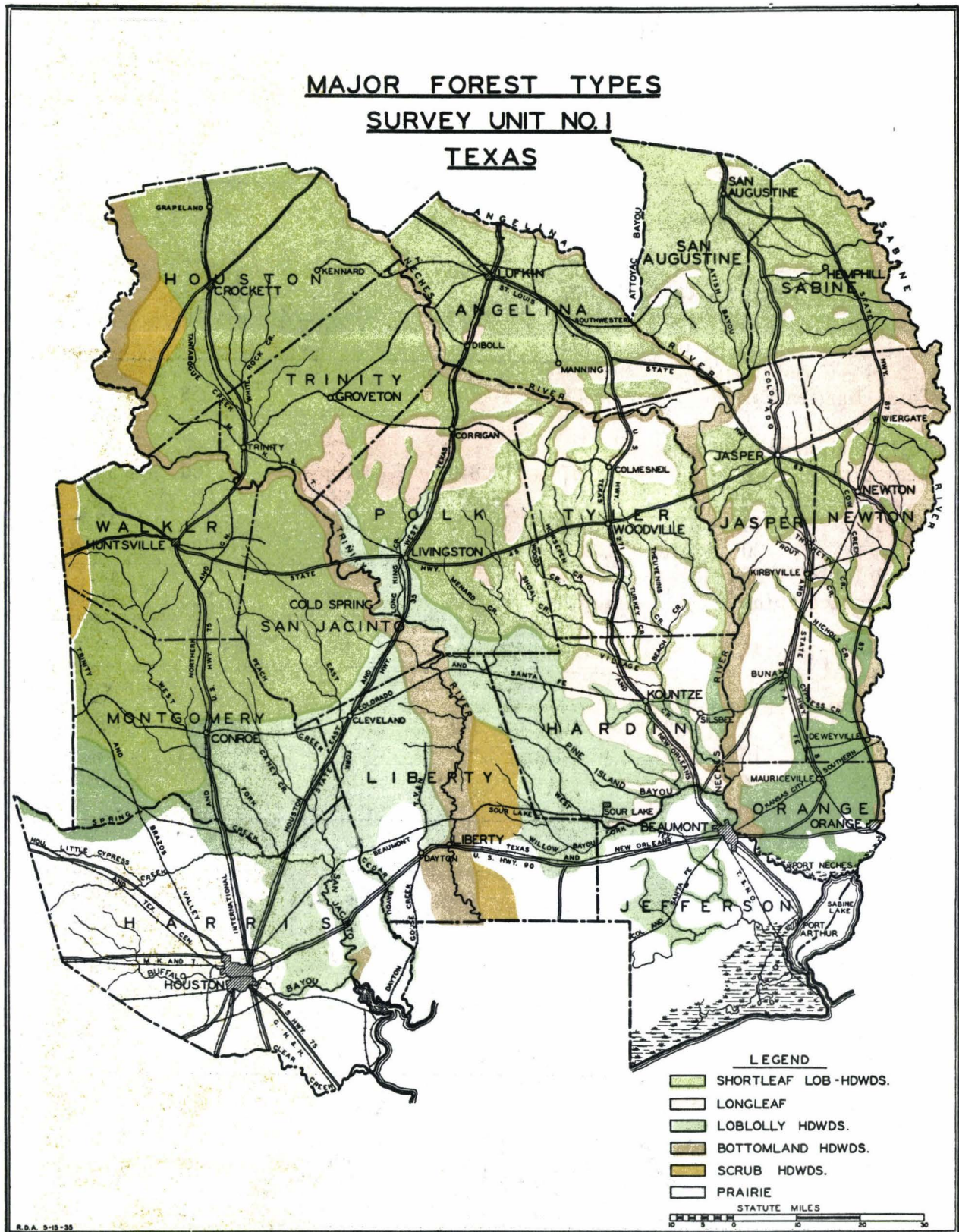


FIGURE 2. -- Geographical distribution of forest types

TABLE 3. -- Cordwood volume¹ in pine and hardwood species groups, by tree diameter classes and forest type groups

Tree species groups	Tree diameter classes ²	Forest type groups designated by predominant species			Total	Percent of total volume
		Longleaf pine	Loblolly and short-leaf pine	Hardwood		
<i>Inches ----- Thousands of cords ³ -----</i>						
Pulping species:						
Longleaf pine	6" - 8"	553	63	5	621	.8
	10" - 12"	1,077	75	5	1,157	1.4
	14" - 18"	1,115	52	3	1,170	1.4
	20" & over	593	17	-	610	.7
Total longleaf pine		3,338	207	13	3,558	4.3
Loblolly and short-leaf pine	6" - 8"	337	10,810	613	11,760	14.1
	10" - 12"	411	14,327	343	15,081	18.1
	14" - 18"	313	10,718	117	11,148	13.4
	20" & over	100	3,690	44	3,834	4.6
Total loblolly and shortleaf pine		1,161	39,545	1,117	41,823	50.2
Total pine		4,499	39,752	1,130	45,381	54.5
Pulping hardwoods ⁴	6" - 8"	68	1,590	1,192	2,850	3.4
	10" - 12"	55	2,018	1,860	3,933	4.7
	14" - 18"	34	1,693	2,018	3,745	4.5
	20" & over	4	644	2,139	2,787	3.4
Total pulping hardwoods		161	5,945	7,209	13,315	16.0
Total pulping species		4,660	45,697	8,339	58,696	70.5
Nonpulping hardwoods ⁵	6" - 8"	195	3,197	2,315	5,707	6.8
	10" - 12"	68	3,607	3,447	7,122	8.6
	14" - 18"	46	2,731	3,788	6,565	7.9
	20" & over	24	1,277	3,894	5,195	6.2
Total nonpulping hardwood		333	10,812	13,444	24,589	29.5
Total all species		4,993	56,509	21,783	83,285	100.0
Percent of total volume		6.0	67.8	26.2	100.0	

¹ These are gross volumes; woods cull has not been deducted. It is believed that final computations will indicate deductions of between three percent and six percent for woods cull. (Other footnotes continued on following page).

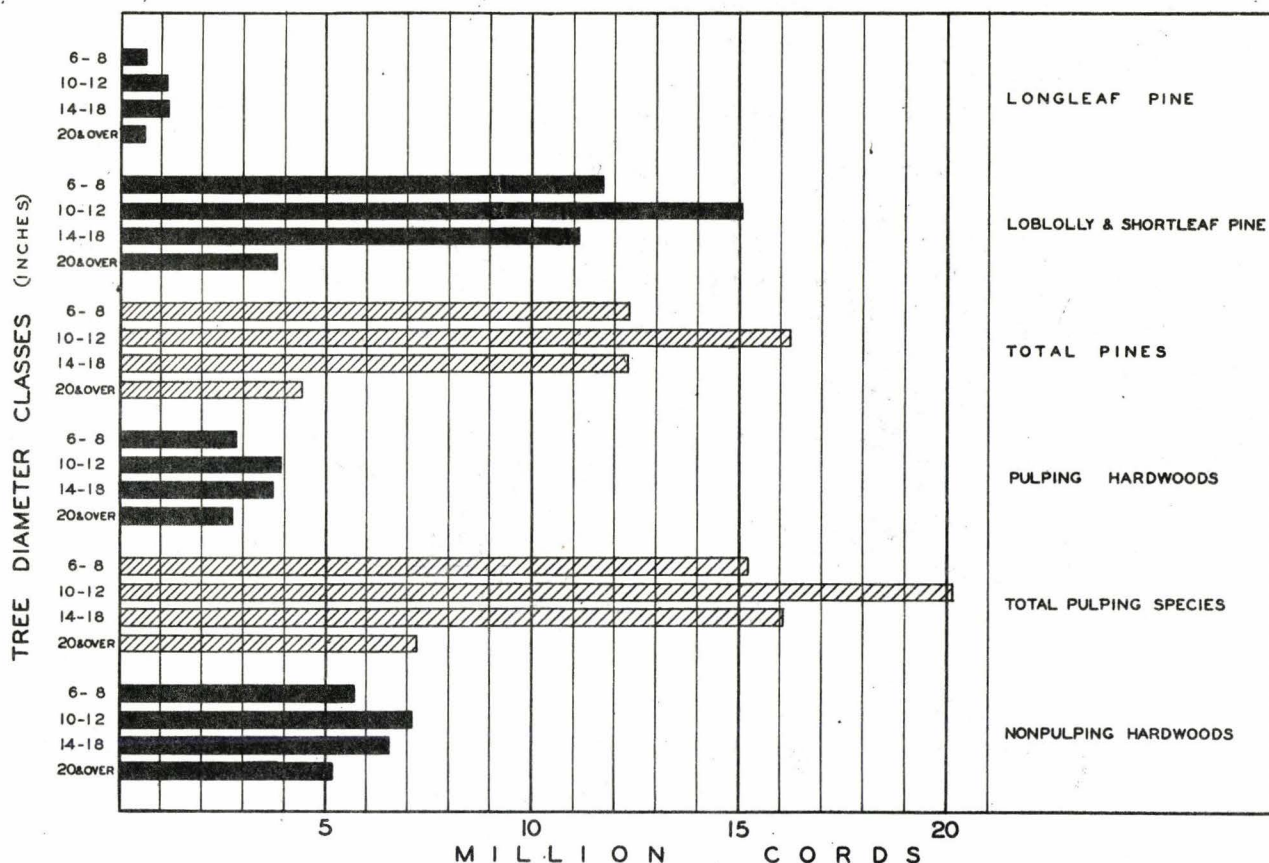


FIGURE 3. -- Classification of cordwood volume by species groups and tree-diameter classes

Table 4 classifies the cordwood volume for the average acre by species groups and tree-diameter classes. This volume for the average acre is a theoretical figure derived by dividing the total volume for the Unit by the productive forest acreage. The table shows, on the average acre, a volume of 12.64 cords of wood (without deduction for woods cull) of which nearly three-fourths is in pulping species. In trees under 13 inches in diameter, the pines alone contribute 4.34 cords per acre, while the pulping hardwoods furnish another cord per acre in trees of the same diameter classes.

Whether this per-acre volume of wood in pulping species will ultimately be given over to the manufacture of pulp, lumber, or other forest products, will depend on the size and quality of the individual trees and on the existing demand for each product.

(Footnotes continued from page 8)

² Diameters at breast height (4½ feet from the ground). Trees ranging from 5.0 inches to 8.9 inches in diameter outside of bark are placed in the 6" - 8" class; corresponding limits apply to the other diameter classes.

³ To convert to full number of cords add "000".

⁴ Gum, basswood, bay, magnolia, maple, and willow.

⁵ Cypress, oak, hickory, ash, beech, elm, hackberry, holly, and persimmon.

TABLE 4. -- Cordwood volume¹ on the average acre of productive forest land, by pulping and non-pulping species groups and tree diameter classes

Tree species groups	Tree diameter classes ²								Total all diameter classes	
	6" - 8"		10" - 12"		14" - 18"		20" & over			
	Cords	% of total	Cords	% of total	Cords	% of total	Cords	% of total	Cords	% of total
Pulping species:										
Longleaf pine.	.09	.7	.17	1.4	.18	1.4	.10	.8	.54	4.3
Loblolly and shortleaf pine	1.79	14.2	2.29	18.0	1.69	13.4	.58	4.6	6.35	50.2
Total pine	1.88	14.9	2.46	19.4	1.87	14.8	.68	5.4	6.89	54.5
Hardwood ³	.43	3.4	.60	4.8	.57	4.5	.42	3.3	2.02	16.0
Total pulping	2.31	18.3	3.06	24.2	2.44	19.3	1.10	8.7	8.91	70.5
Nonpulping										
hardwood ⁴	.87	6.9	1.08	8.6	.99	7.8	.79	6.2	3.73	29.5
Total all species	3.18	25.2	4.14	32.8	3.43	27.1	1.89	14.9	12.64	100.0

¹ These are gross volumes; woods cull has not been deducted. It is believed that final computations will indicate deductions of between three percent and six percent for woods cull.

² Diameters measured at breast height (4-1/2 feet from the ground). Trees ranging from 5.0 inches to 8.9 inches in diameter outside of bark are placed in the 6"-8" class; corresponding limits apply to the other diameter classes.

³ Gum, basswood, bay, magnolia, maple, and willow.

⁴ Cypress, oak, hickory, ash, beech, elm, hackberry, holly, and persimmon.

Summary

Texas Survey Unit No. 1 covers an area of nearly ten million acres. Its topography is that of a gently rolling plain. Two-thirds of the total land area, or approximately 6,601,200 acres, is forest land. Nearly three-fourths of this area bears mixed pine stands of longleaf, shortleaf, and loblolly. The total cordwood volume of the Unit exceeds 83 million cords, of which 70 percent is in pulping species. Shortleaf and loblolly pine make up half the total cordwood volume. Considering all species, trees less than 13 inches in diameter aggregate more than 48 million cords, or nearly 58 percent of the total cordwood volume in the Unit. The average acre of productive forest land bears nearly thirteen gross cords of wood, of which seven cords are in pine species, two cords in pulping hardwoods, and four cords in nonpulping hardwoods. The Unit is well served by railroad lines and highways and is accessible to deep water shipping ports.